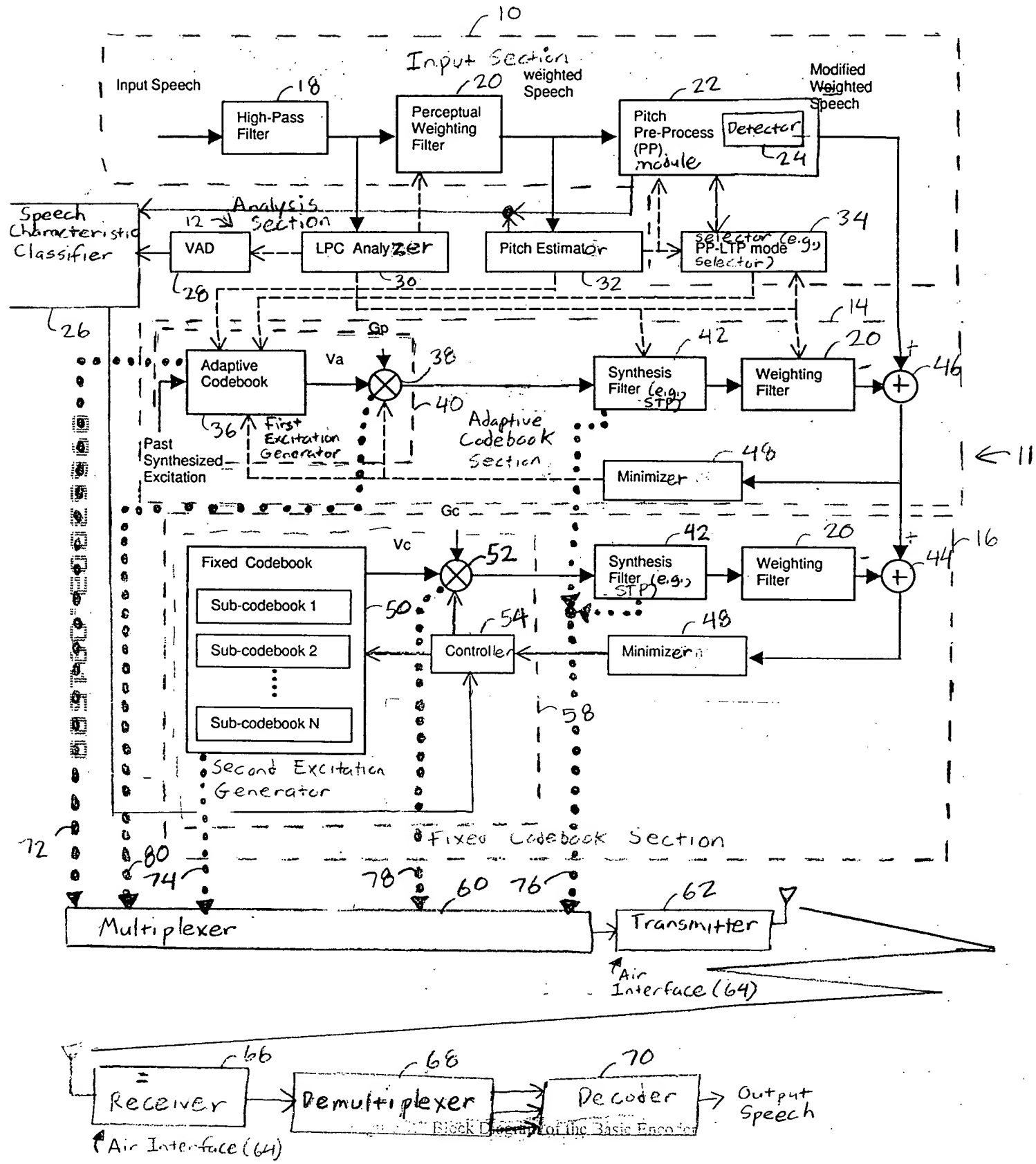
FIG. 1


10
Input Section
Input Speech
18
High-Pass Filter
20
Perceptual Weighting Filter
weighted Speech
22
Pitch Pre-Process (PP) module
Detector
24
Modified Weighted Speech
Analysis Section
12
Speech Characteristic Classifier
VAD
LPC Analyzer
Pitch Estimator
34
selector (e.g., PP-LTP mode selector)
26
28
30
32
14
Gp
Va
38
Adaptive Codebook
42
Synthesis Filter (e.g., STP)
Weighting Filter
20
46
40
Adaptive Codebook Section
36
First Excitation Generator
Past Synthesized Excitation
48
Minimizer
11
Gc
Vc
52
Fixed Codebook
Sub-codebook 1
Sub-codebook 2
Sub-codebook N
50
54
Controller
58
Second Excitation Generator
Fixed Codebook Section
16
44
72
80
74
78
60
76
62
Multiplexer
Transmitter
Air Interface (64)
66
Receiver
68
Demultiplexer
70
Decoder
Output Speech
Air Interface (64)
Block Diagram of the Basic Encoder

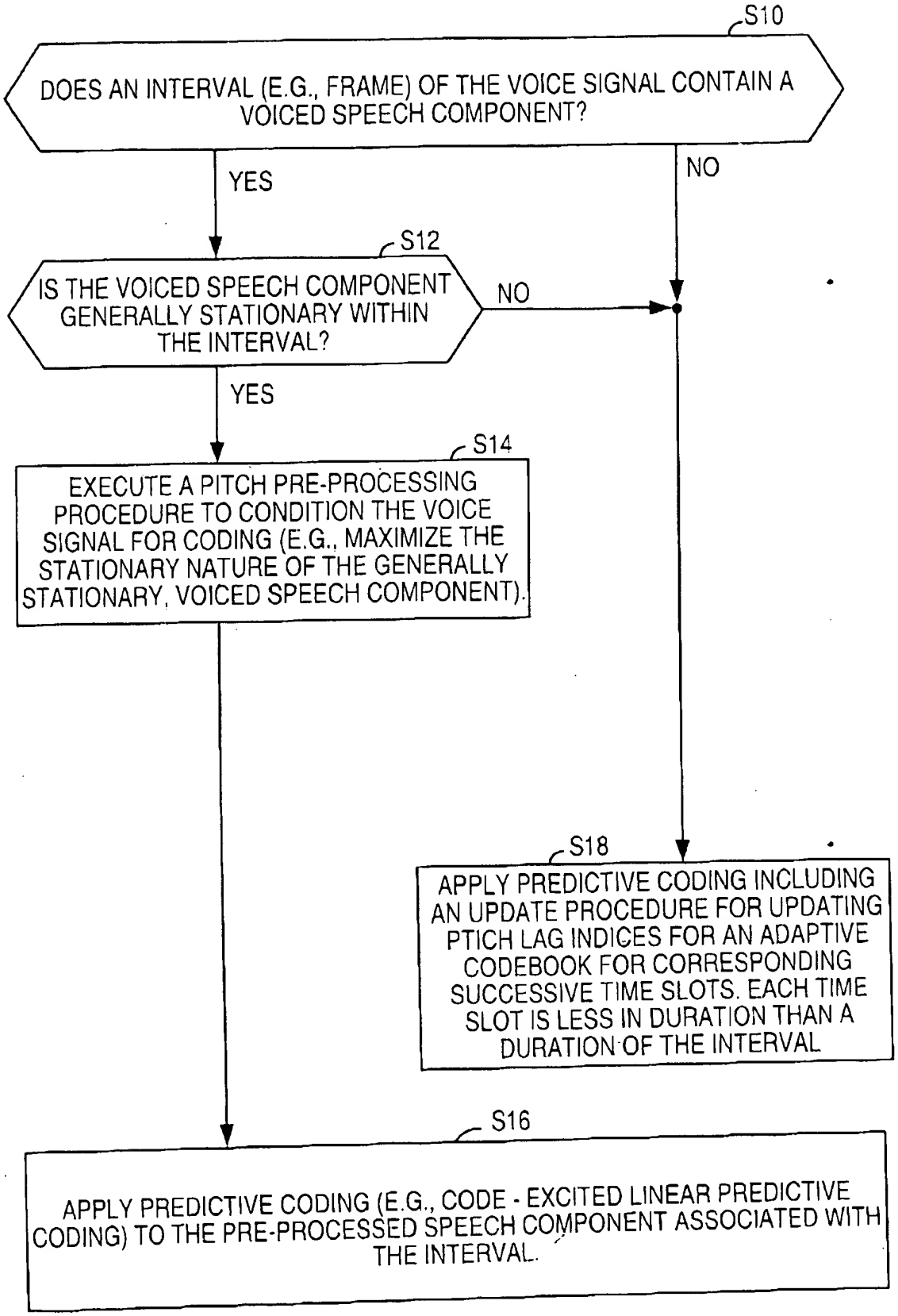

S10
DOES AN INTERVAL (E.G., FRAME) OF THE VOICE SIGNAL CONTAIN A VOICED SPEECH COMPONENT?
YES
NO
S12
IS THE VOICED SPEECH COMPONENT GENERALLY STATIONARY WITHIN THE INTERVAL?
NO
YES
S14
EXECUTE A PITCH PRE-PROCESSING PROCEDURE TO CONDITION THE VOICE SIGNAL FOR CODING (E.G., MAXIMIZE THE STATIONARY NATURE OF THE GENERALLY STATIONARY, VOICED SPEECH COMPONENT).
S18
APPLY PREDICTIVE CODING INCLUDING AN UPDATE PROCEDURE FOR UPDATING PTICH LAG INDICES FOR AN ADAPTIVE CODEBOOK FOR CORRESPONDING SUCCESSIVE TIME SLOTS. EACH TIME SLOT IS LESS IN DURATION THAN A DURATION OF THE INTERVAL
S16
APPLY PREDICTIVE CODING (E.G., CODE - EXCITED LINEAR PREDICTIVE CODING) TO THE PRE-PROCESSED SPEECH COMPONENT ASSOCIATED WITH THE INTERVAL.

FIG. 2

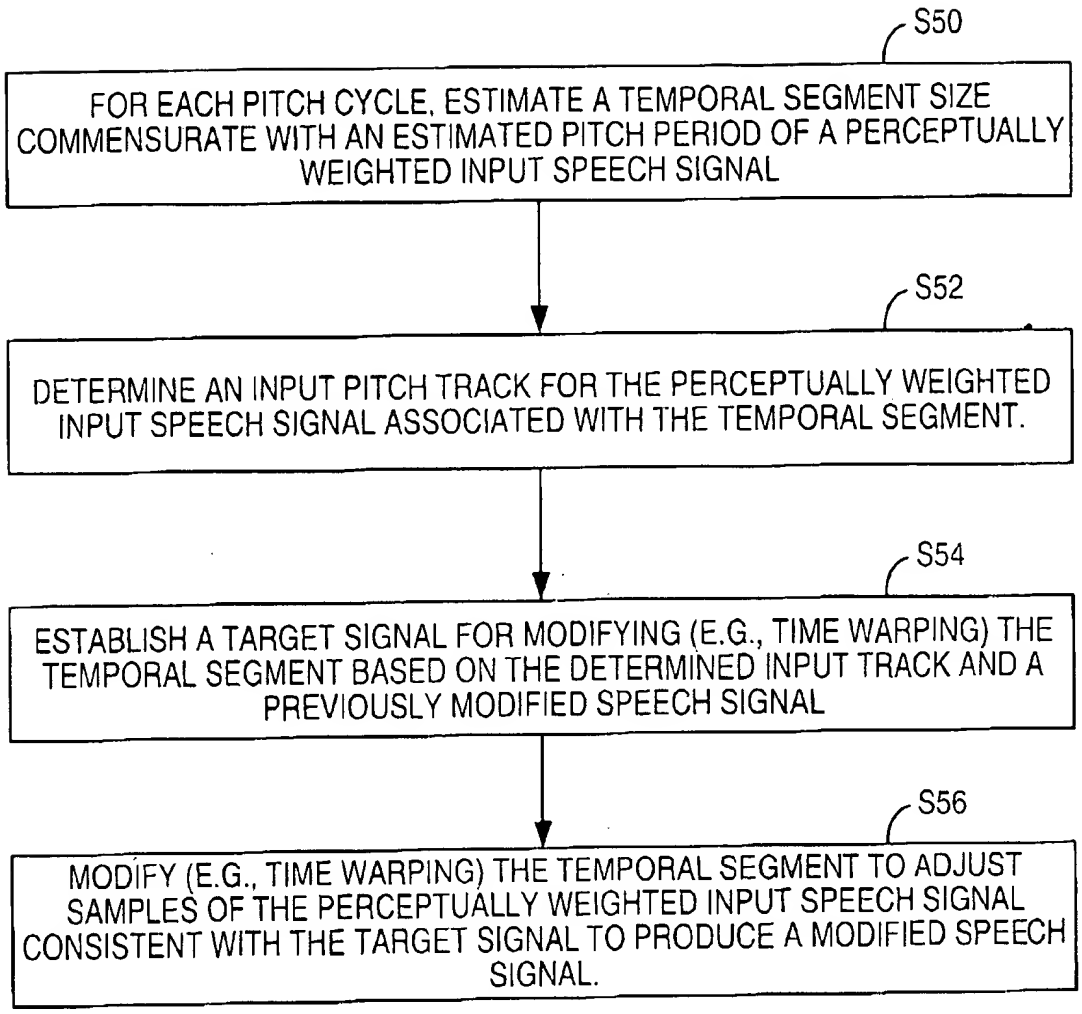


FIG. 3

09/14/2000 13:42 410-602-6161 NINE FORTY EIGHT PAGE 15

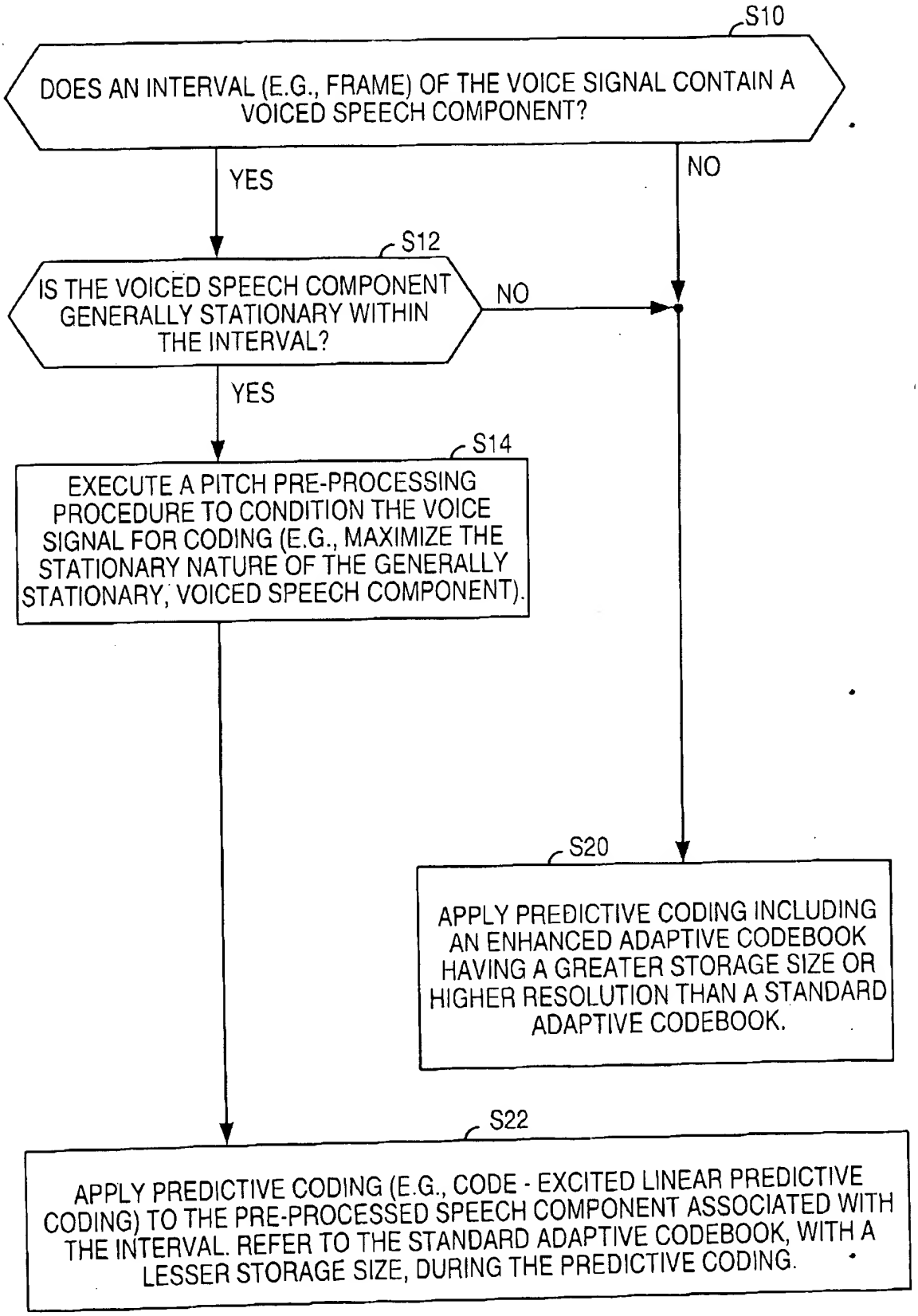


FIG. 4

09/14/2000 13:42 410-602-6161 NINE FORTY EIGHT PAGE 16

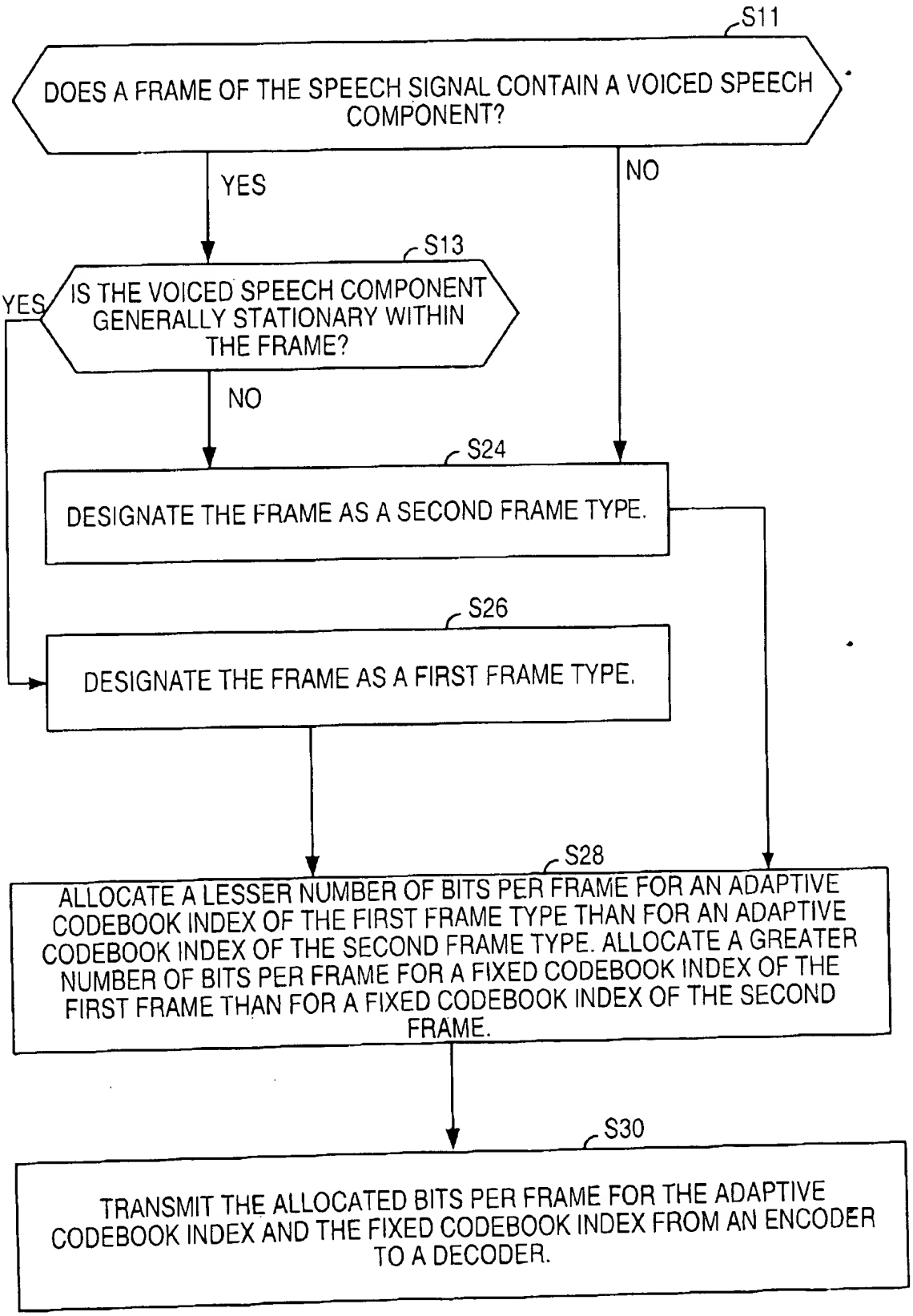


FIG. 5

09/14/2000 13:42 410-502-6161 NINE FORTY EIGHT PAGE 17

ENCODING SCHEME	FIRST ENCODING SCHEME 99		SECOND ENCODING SCHEME 97	
FRAME DURATION	20 ms		20 ms	
FRAME TYPE	1ST FRAME TYPE (4 SUBFRAMES)		2ND FRAME TYPE (4 SUBFRAMES)	
FILTER COEFFICIENT INDICATORS (E.G., LSF'S) 76	1ST STAGE 2ND STAGE 3RD STAGE 4TH STAGE	7 BITS 6 BITS 6 BITS 6BITS 25 BITS	INTERPOLATION 1ST STAGE 2ND STAGE 3RD STAGE 4TH STAGE	2 BIT 7 BITS 6 BITS 6 BITS 6BITS 27 BITS
TYPE INDICATOR 71		1 BIT	1 BIT	
ADAPTIVE CODEBOOK 72	8 BITS/FRAME	8 BITS	8,5,8,5 BITS/SUBFRAME	26 BITS
FILTER CODEBOOK INDEX 74	8 - PULSE CODEBOOK	2^{30} ENT./SUBFRAME	5 - PULSE CODEBOOK 5 - PULSE CODEBOOK 5 - PULSE CODEBOOK	2^{21} ENT./SUBFRAME 2^{20} ENT./SUBFRAME 2^{20} ENT./SUBFRAME 2^{22} ENT./SUBFRAME
80	30 BITS/SUBFRAME	120 BITS	22 BITS/SUBFRAME	88 BITS
ADAPTIVE CODEBOOK GAIN	4D PRE VQ/FRAME	6 BITS	2D VQ/SUBFRAME	7 BITS/SUBFRAME 28 BITS
FIXED CODEBOOK GAIN 78	4D DELAYED VQ/FRAME	10 BITS		
TOTAL BITS	170 BITS		170 BITS	

FIG. 6

ENCODING SCHEME	THIRD ENCODING — 103 SCHEME		FOURTH ENCODING — 101 SCHEME	
FRAME DURATION	20 ms		20 ms	
FRAME TYPE	3RD FRAME TYPE (3 SUBFRAMES)		4TH FRAME TYPE (2 SUBFRAMES)	
LSF'S — 76 FILTER COEFFICIENT INDICATORS (E.G., LSF'S)	1 BIT 7 BITS 7 BITS 6 BITS 21 BITS		PREDICTOR SWITCH 1ST STAGE 2 STAGE 3RD STAGE	
TYPE INDICATOR — 71	1 BIT		1 BIT	
ADAPTIVE CODEBOOK — 72	7 BITS/FRAME	7 BITS	7 BITS/SUBFRAME	14 BITS
FIXED CODEBOOK INDEX 74	2 - PULSE CODEBOOK 3 - PULSE CODEBOOK	2^{12} ENT./SUBFRAME 2^{12} ENT./SUBFRAME 2^{13} ENT./SUBFRAME	2 - PULSE CODEBOOK 3 - PULSE CODEBOOK GAUSSIAN CODEBOOK	2^{14} ENT./SUBFRAME 2^{13} ENT./SUBFRAME 2^{13} ENT./SUBFRAME 2^{15} ENT./SUBFRAME
80	13 BITS/SUBFRAME	39 BITS	15 BITS/SUBFRAME	30 BITS
ADAPTIVE CODEBOOK GAIN	3D PRE VQ/FRAME	4 BITS	2D VQ/SUBFRAME	7 BITS/SUBFRAME 14 BITS
FIXED CODEBOOK GAIN 78	3D DELAYED VQ/FRAME	8 BITS		
TOTAL BITS	80 BITS		80 BITS	

FIG. 7